132 the sun's rays and so may be much colder, especially during calm periods which are frequent, than places with southward aspect on the hills above: on occasion a difference of 20° C. has been noted. Places out in the opener lands towards Russia feel the winter cold of the steppe spreading westward, but both these and places in shut-in valleys may be very dry. The high pastures have a good deal of snow in winter and are nearly forsaken at that season but, when the snow melts in spring, growth sets in rapidly, and the change of season is [137] sudden. Out east in the opener lands there is, however, for a while a danger of the sudden recurrence of frost (the Ice Saints in the Russian steppe), a fact which helps to limit the eastward extension of the beech tree almost as much as does the summer heat, for both these conditions are specially harmful to the delicate beech leaves. Roumania is thus on the eastern limit of the general European distribution of the beech which is one of the characteristic plants of western and central Europe and is absent from Russia, save the Crimea and parts of the Caucasus region. It is important to note that winter cold is not an important factor of this distribution as the beech grows on the higher slopes of the Carpathians under severe conditions.

A MONTH with an average of less than 25 mm. (or 1 inch) of rain or the equivalent in snow is very rare save at Cernauţi, Dorohoi, Vatra Dornei and Chişinau in winter especially January. The summer maximum is in June at Dorohoi (102 mm.); at Cernauţi June and July both average 94 mm.; at Vatra Dornei June has 129 and July 135 mm. On the west side of the Carpathians, at Cluj and Sibiu, for example, the June rainfall is the highest (111-114 mm.), and the figures show a tendency to rather more rain in April and May as well as in July and August than on the east side. The annual totals on both sides of the Carpathians in the latitude of most of the places named may be said to vary between 550 and 750 mm. Farther south, on the east side, at Focşani, for example, the June rainfall attains only 82 mm. average, and May and July have 60 mm. and 57 mm. respectively; further, the annual total is just 550 mm. and at Buzau (Buzeu) rather farther south it diminishes to 476 mm., and at Constanţa to 381 mm. At Vatra Dornei it may rain on nearly half the days of the year, at Buzau on hardly a quarter. At Vatra Dornei, moreover, precipitation may be

III.—NOTES ON THE VEGETATION OF ROUMANIA

137 AFTER a voyage of five days down the Danube where hundreds of miles of its banks were clothed with willows (*Salix cinerea*) and formed our almost sole glimpse of vegetation, the first thing the Vegetation Group did on landing at Giurgiu was to make contact with the flora of Roumania. A walk along the side of the railway parallel to the river revealed the following species: *Xanthium speciosum*, *Trifolium fragiferum*, *T. lappaceum* (an alien possibly transported by rail or ship), *Setaria glauca*, *Datura stramonium*, *Berteroa incana*, *Trigonella procumbens*, *Althaea officinalis*, *Inula brittanica*, *Hibiscus trionum*, *Salvia sylvestris*, *Glycyrrhiza echinatum*, *Amaranthus albus* and many others less worthy of note and mostly belonging to the mid-European element.

DURING our visit to Snagov, where we enjoyed the kind hospitality of the Mayor of Bucureşti (Bukarest), we saw large quantities of *Vallisneria spiralis* growing close to the banks of the lake. Near the old monastery church the following plants were noted: *Xanthium strumarium*, *Astragalus acer*, *Galega officinalis*, *Chenopodium ficifolium*, *Filago arvensis*, *Nepeta pannonica*, etc.

243 BOTH on our way from Giurgiu to Bucureşti by train, and by the roadside on leaving the capital towards Ploeşti, we were reminded of the fact that the maize was the staple crop and it was here seen in the plains growing to perfection in striking contrast to that seen later around Borsec in the narrow valley towards Corbu.

OUR next contact with vegetation was during the motor drive over elevated ground from Sinaia to Dobreşti; here the grass had not been cut in the sub-alpine meadows and the flora was seen to be a very rich one, but time did not permit of its being examined. From Dobreşti, a climb via a fine gorge was made to the alpine Peştera hut. On our way up the gorge large masses of the tall, yellow *Inula helenium* were passed and *Achillea Schurii* (endemic to the Carpathians) was seen on the wet walls of rock, and also *Bruckenthalia spiculifolia*. As more elevated ground was

reached there was little to be seen, the alpine meadows having been closely cropped by sheep. During an early morning walk in the neighbourhood of the hut, more alpine conditions were seen to be prevalent and plants typical of such regions were recorded, such as: *Ranunculus nemorus, Polygala amara, Genista tinctoria, Saxifraga aizoon, Alsine gerardi, Heliosperma quadrifida, Viola declinata* (endemic), *Gentiana nivalis, G. utriculosa, Campanula carpatica, Dianthus gelidus* (endemic), *D. spiculifolius* (endemic), *Pedicularis verticillata, Rhododendron Kotshyi* (endemic), *Sedum atratum, Pleurogyne carinthiaca, Phleum alpinum, Potentilla aurea, Anemone alba, Primula minima, Scorzonera rosea, Loiseleuria procumbens*, etc. Unfortunately a very heavy thunderstorm with torrential rain made it impossible to investigate the flora on the interesting plateau country passed shortly after leaving the Peştera hut on our way down to Bu[illegible]teni.

BRAN was our next place of stay and the hill sides round the town proved very interesting floristically. Some 160 common plants were recorded in addition to *Coronilla varia, Impatiens noli-tangere, Actaea spicata, Monotropa hypopitys, Centaurea pseudo-phrygia, Nepeta pannonica, Trifolium alpestre, T. ochroleucum, Chaerophyllum aromaticum, Inula hirta, Erysimum repandum, Galinsoga parviflora, Salvia verticillata, Brunella grandiflora, Linum flavum, Hypericum transylvanicum, Scabiosa ochroleuca, Selinum carvifolium, Bupleurum falcatum, Seseli annuum, Luzula albida*, etc. Above the hotel was a considerable stretch of beech forest intermixed with spruce (*Picea excelsa*); on the lower edge of this was the usual hazel (*Corylus avellana*), alder (*Alnus incana*), Cornelian cherry (*Cornus mas*), hornbeam (*Carpinus betulus*), etc. At the foot of the slope on damp ground were clumps of *Salices* and *Alnus incana*. Around the cottages on the hillsides were patches of potatoes with oats and sometimes a small patch of hemp; some of this freshly cut and being retted in a shallow pit dug in the ground was also noted. Generally speaking, the flora around Bran itself was a very rich one. Close by the hotel the following species of Mycetozoa were seen: *Stemonitis hyperopta* on an old tree stump, *Arcyria denudata*, maturing on soil, and masses of *Mucilago spongiosa* ripening on old sticks.

137 [241] THE JOURNEY to Braşov (Kronstadt) took us along the valley, both sides of which were well cultivated, potatoes, beans, oats, maize being the chief crops; sunflowers and small patches of hemp were also seen. A halt for petrol, a short distance from Bran, provided an opportunity for studying the meadow land vegetation close to the road; the following were noted: *Scilla trilobium, Centaurea scabiosa, Coronilla varia, Hypericum perforatum, Medicago falcata, Peucedanum oreoselinum, Knautia arvensis, Campanula rotundifolium, Helianthemum chamaecistus, Stachys betonica, Dianthus Carthusianorum, Viola tricolor, Senecio aquatica, Trifolium procumbens, Achillea millefolium, Chrysanthemum leucanthemum, Campanula trachelium, C. rapunculus, Cirsium oleracea, Galium verum, G. Mollugo, Geranium pratense, Lathyrus pratensis, Melampyrum nemorosum*, etc.

AT BRAŞOV were seen *Potentilla canescens* and *Silene otites* among many commoner species.

IT WAS NOT until we reached Borsec that we had time to study the vegetation in any detail, and it was somewhat unfortunate that the truly sub-alpine and alpine regions were not within easy reach. The greater part of the mountain sides surrounding Borsec were covered with spruce forests quite to the summits and beech forest was not well represented, being met with as somewhat poor specimens often at a considerable height. These forests proved to be rather deficient in species, botanically.

DURING our walk from Borsec across meadows and up on to the summit of Bukkhavas, it was interesting to see the beech and birch above the limit of the spruce. *Ribes grossularia* was seen in fruit in open spots in the forest. The open summit was covered with *Vaccinium myrtillus* with its usual association; *Scorzonera rosea* was also growing upon the summit. Leaving the mountain and going down towards Bilbor we noted a grassy clearing with a building where cattle had been housed: this as in other cases was covered with a prolific growth of dock (*Rumex sp.*); it invariably accompanied places where mountain dairies had been established. On reaching the valley a fine clump of *Dianthus superbus* was seen.

244 A WALK around the cottages of Old Borsec revealed several vegetable gardens apparently associated with the possibility

244 of supplying the summer visitors with vegetables. Runner beans, potatoes, poppy-seed, cabbages, red beet, onions, lettuce, and carrots were common, and in one garden in addition to the above, red currants, gooseberries, vegetable marrows, fennel, caraway and leeks were growing.

● 137 THE following plants were noticed in the neighbourhood of Borsec: *Senecio fuchsii, Maianthemum bifolium, Gentiana cruciata, G. asclepiadea, Stachys alpina, Chaerophyllum hirsutum, Dipsacus laciniatus, Trifolium pannonicum, Myosotis sparsiflora, Carduus personata, Campanula cervicaria, Lychnis viscaria, Silene armeria, Dianthus armeria, Dianthus superbus, Salix pentandra, Turritis glabra, Calamagrostis epigeios.*

ONE very interesting area was visited by Capt. Chase, viz. the Red Rocks near Tulgheş (Tölgyes): on account of the number of interesting plants to be found there this area has been preserved under the care of the Botanic Garden of Cluj. Tulgheş is the village which comes next to Corbu and here the mountains rise up from the valley floor of the Bistricioara and are covered with forests, the spruce (*Picea excelsa*) being dominant and reaching quite down to the valley which here has an altitude of about 600 metres. It was noted that sparse deciduous forest occurred above the spruce, the chief trees being the pedunculate oak (*Quercus pedunculata*), hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), hornbeam (*Carpinus betulus*), with scattered examples of lime (*Tilia cordata*) and poplar (*Populus tremula*). Climbing higher, a narrow belt of birch (*Betula verrucosa*) occurred followed by beech (*Fagus silvatica*), with examples of sycamore (*Acer pseudo-platanus*) and lime. Still higher up, as usual, there was summer pasturage for sheep. The conspicuous cliffs, the "Red Rocks," could be seen standing out above the forest, and near them Capt. Chase recorded the following: *Sempervivum hirtum, Arabis arenosa, Phleum montanum, Cytisus leucotrichus, Campanula carpatica, Senecio rupestris, Spiraea ulmifolia, Allium montanum, Libanotis montana, Thalictrum foetidum, Melampyrum saxosum,* and what was one of the chief objects of the visit, plants of the outstanding endemic *Astragalus Romeri* growing in a ravine between the rocks.

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The Visit to Mt. Ceahlau.

One of the most interesting excursions botanically was that made to Mont Ceahlau, which forms part of the Moldavian Carpathians and rises in its most elevated part to just over 1,900 metres.

The mountain itself is formed of Cretaceous Flysch which is much folded; near the summit there were banks of sandstone and excellent examples of conglomerate.

Unfortunately, the mountain was a considerable distance from Borsec, necessitating a start at 6.30 a.m. and a long journey by car. As the same journey had to be made on the homeward route much less time was spent upon this interesting mountain than one would have liked. The ideal would have been to have spent at least one night in the well-appointed alpine "Cabine" upon the summit. With the exception of the climb to the Peştera hut after leaving Sinaia, Ceahlau was the only really typical sub-alpine region visited during our stay in Roumania. As we drove along the

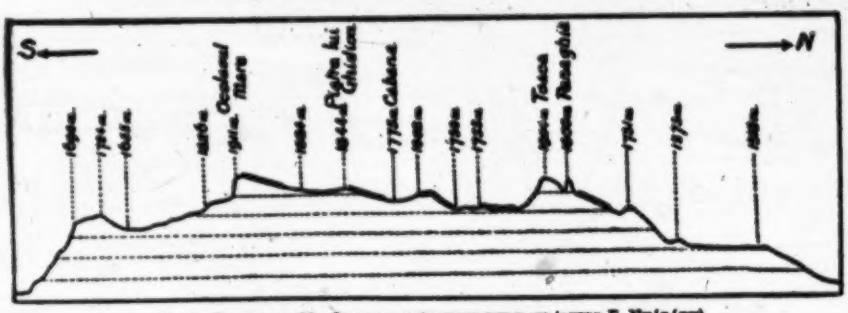

Fig. 3.—Profile of Mt. Ceahlau seen from the east (after E. Nyárády)

narrow road by the side of the small tributary stream, to the Durau monastery from which the ascent was made, the following plants were noticed: *Myricaria germanica*, *Petasites albus*, *Salix incana* and the large yellow-flowered *Telekia speciosa*; the three first-named are typical plants found in the neighbourhood of stream beds in such regions, the other had never been seen previously by any member of the Vegetation Group.

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137 After passing across the meadows near the monastery we passed successively through three definite zones of vegetation (see Fig. 3) :

(*a*) The beech zone (*Fagus silvatica*).
(*b*) The spruce zone (*Picea excelsa*).
(*c*) The zone of mountain pine (*Pinus montana*).

1. The Beech Zone, or Lower Mountain Zone.

This reached up to a height of about 650 metres. The beech here was the dominant tree, the woods were somewhat thin and here and there one occasionally saw a very tall specimen with a perfectly straight bole and practically no branches except at the top. In this area there was also a number of rather weedy-looking birches (*Betula verrucosa*). The principal plants of this zone were *Pyrola uniflora, Circaea alpina, Impatiens noli-tangere, Geranium phaeum, Salvia glutinosa,* whilst among the woody elements were *Salix caprea, Alnus incana, Sorbus aucuparia, Sambucus racemosa, Corylus avellana, Populus tremula,* and *Acer pseudo-platanus.*

2. The Spruce Zone, or Upper Mountain Zone.

This began at about 650 metres and reached to 1,700 metres, forming a broad belt which appeared to encircle the entire mountain as it could be seen all along the slopes as we mounted somewhat steeply. As is usually the case on mountain slopes the line of demarcation between this zone and the previous one was not at all clearly defined ; here and there one intruded into the other as the result of the influence of the ecological factors in a particular area. In this spruce zone two other conifers are said to occur sporadically, viz., the larch (*Larix decidua* forma *carpatica*) and the Scots fir (*Pinus sylvestris*) ; on our ascent only an occasional example of the latter was seen.

In the forest and the clearings and on the rocky walls were many plants and one could only notice a few in passing : *Daphne mezereum, Lonicera xylosteum, Ribes alpinum* and *R. grossularia, Allium victorialis, Listera ovata, Trollius europaeus, Aconitum moldavicum, Parnassia palustris, Linum catharticum, Alchemilla vulgaris, Epilobium parviflorum, Circaea alpina, Pyrola rotundifolia, P. secunda, Gentiana carpatica, Geum robertianum, Sanicula europaea, Centaurea*

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scabiosa, *Stachys alpina*, *Chrysanthemum rotundifolium*, *Salvia glutinosa*, *Arnica montana*, *Carlina acaulis*, *Lycopodium selago* and *L. clavatum*. In shady places several ferns occurred such as *Asplenium trichomanes*, *Phegopteris robertianum*, *Asplenium viride*, etc.

3. Zone of Mountain Pine (*Pinus montana* Var. *mughus*) or Sub-alpine Zone.

As one emerged from the spruce forests on to the plateau, the dominant feature was the masses of *Pinus montana* sub-species *mughus* with associations of the dwarf juniper (*Juniperus nana*) accompanied by *Vaccinium myrtillus*, *V. vitis-idaea* and *V. uliginosum*. In one instance *V. myrtillus* covered a large slope and peasants were gathering the fruits. Another characteristic plant covering a large area as we passed the path leading up the slopes to the summit of Toaca (1,904 metres) was *Dryas octopetala*, the light feathery fruits making the patch very conspicuous. A species of willow, *Salix Kitaibeliana*, was also noticed. As previously mentioned, the dominant tree of this zone is *Pinus montana*, met with in similar situations on our visits to the High Tatra of the Carpathians in Poland and Czechoslovakia, and to the Julian Alps of Yugoslavia. Its tortuous, flexible branches growing out close to the ground, formed in places an almost impenetrable barrier. Some fine and very old specimens were seen bearing cones, and, from its characteristic features, it obviously belonged to the sub-species *mughus*. As is well seen in the photograph (Plate III), *Pinus montana* occurs either massed in association or in circular, flattened, isolated clumps. Occasionally where sufficient protection was afforded, small spruces were seen.

Where the mountain pine formed a large association it provided sufficient shelter for the development of *Vacciniæ* and mosses, *Vaccinium myrtillus* being dominant and *Hylocomium splendens* the commonest moss. In company with these plants one saw patches of Iceland lichen (*Cetraria islandica*), *Oxalis acetosella*, *Homogyne alpina*, and *Luzula silvatica*.

It was in this sub-alpine region that we found many interesting plants and they may be grouped roughly under the following habitats :

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Near the summit of Cashlau, showing zone of mountain pine (*Pinus montana var mughus*)—sub-alpine "Krummholzregion." The pine is seen in rounded clumps on the mountain slopes, but covers a large area on the flattened summit (see Vegetation notes).

Photo: R. J. Howard.

[facing page 24]

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(*a*) *Clearings and uncovered areas.*

THE endemic *Primula leucophylla*, *Dentaria glandulosa*, *Soldanella hungarica*, *Veratrum lobelianum*, *Alyssum repens*, *Linum extraxilare*, *Alchemilla montana*, *Scorzonera rosea*, *Silene Zawadskii* (endemic), *Solidago alpestris*, *Erigeron alpinum*, *Doronicum austriacum*, etc. Among the *Gramineae* and *Juncaceae* were seen *Festuca supina*, *Nardus stricta*, *Sesleria caerulea*, *Calamagrostis villosa*, *Luzula silvatica* and *Luzula maxima*.

(*b*) *The sub-alpine meadow.*

ALTHOUGH there was little time to explore the very large area covered by this type of vegetation, several plants of distinctly alpine character were found and are regarded by Roumanian botanists as undoubted glacial relics. We were surprised to see several of these plants at such relatively low altitudes and were quite prepared to find that their occurrence was a floristic peculiarity of Ceahlau. Those noted were : *Pedicularis versicolor*, *Saxifraga oppositifolia*, *Polygonum viviparum*, *Saxifraga androsace*, *Dryas octopetala*, *Cerastium lanatum* and *Lycopodium selago*.

(*c*) *The Tundras.*

THESE occurred in the *Pinus montana* clearings and open slopes and as is usual in such habitats the chief elements were lichens, *Cetraria islandica*, and species of *Cladonia* intermingled with patches of *Vaccinia*. There were large rounded masses of mosses and the only woody element conspicuous in this somewhat dry region was the dwarf juniper (*Juniperus nana*). One could not help in passing comparing this type of vegetation with that seen on our visit to the Scandinavian plateau and also in the neighbourhood of Abisko in Swedish Lapland.

(*d*) *The Rocky Walls.*

AROUND the "Cabine" and still more pronouncedly around the summit of Toaca, where the underlying rocks were covered with a thin bed of humus, we met with our most interesting plants. Here grew, unfortunately overpicked by shepherd lads, Edelweiss (*Leontopodium alpinum*), *Eritrichium Jankae* (endemic), *Gypsophila petrea*, *Hieracium villosum*, *Sempervivum Simonkaianum*, *Saxifraga adscendens*, *S. oppo-*

137 *sitifolia*, *S. aizoides*, *S. aizoon*, *Erysimum Witmanni*, *Phyteuma orbiculare*, *Silene Zawadskii*, *Onobrychis montana var. transilvanica*, *Cerastium alpinum*, *C. lanatum*, *Oxytropus campestris*, *Alsine gerardi*, *Campanula alpina*, *C. carpatica*, *Alyssum repens* (endemic), *Rhinanthus alpinus*, *Rhodiola rosea*, *Sedum atratum*. In the cracks in the rocks where moisture collected were noted *Pinguicula alpina*, *P. vulgaris*, *Saxifraga aizoides*, *S. androsacea*, *Viola biflora*, *Arabis alpina*, *Achillea Schurii*, *Biscutella laevigata*, and *Androsace lactea*.

It was obvious that to make a detailed study of this interesting mountain with its forest, plateau, gullies, scree slopes, etc., and other varying ecological factors, a much longer time would have been necessary than was possible under the conditions of our visit to the country.

THE WALK BY WAY OF BILBOR, PALTINIŞ, VATRA DORNEI, ETC., AND DOWN THE BISTRITA RIVER BY TIMBER RAFT TO BROŞTENI (BROSCENI).

133 233 THIS interesting excursion was made by a number of the party, and afforded a very good opportunity of seeing the country as some fifty miles were covered on foot in two days. We passed over fine slopes and through delightful valleys with their meadows bedecked with many species of flowering plants. There was time during such a walk only to notice the most salient features of the vegetation. We, however, saw hillsides where sheep were grazed quite to the top, also [343] a mountain dairy where they were being milked. The temporary shelters for those cropping the hay in the valleys at some distance from their usual habitations were interesting, and the whole family appeared to sleep there and cook their meals till the area had been cleared.

531 341 DURING our stay at Vatra Dornei, through the kindness of the mayor and the prefect of the district, we were taken by car over a mountain pass down to Campulung and from thence to the wonderful walled monastery of Moldoviţa (Moldawitza) with fine sixteenth-century frescoes covering 313 its walls. The chief point of interest from a vegetation point of view was the fine spruce forests which we saw and in which felling was in progress, the logs being pushed down the mountain side to timber carts at the bottom. The next day we had evidence of the importance of the lumbering industry

313 as we proceeded down the Bistrița river on a raft of spruce logs to Broșteni. In this way thousands of logs are transported by the current to saw mills lower down the stream. Lumbering was seen *en route* as we passed between slopes covered with fine spruce forests with here and there beech woods and also areas covered with birch.

LEAVING the raft at Broșteni we proceeded to Borsec by car and on the way saw an interesting effect of indiscriminate deforestation. On the slopes far too many trees had been cut down and a huge gully had been formed by a landslide ; a

Gullies and detrital fans resulting from deforestation in Bistrita valley.

house had been completely swept away and near by the soil was level with the top of the fencing round another house (see illustration above).

137 [133] BUDACUL (5,800 feet) was another mountain visited by members of the Vegetation Group. Spruce forest covered the slopes to a height of about 5,000 feet and there were no rocks. The last 500 feet were covered with mosses as well as *Festuca sp.* and the usual three *Vaccinia* with dwarf juniper (*Juniperus nana*). *Veratrum album* and *Hieracium* were the dominant plants in association with those mentioned on the summit, and in the woods below the following occurred : *Chrysanthemum rotundifolium, Scleranthus uncinatus, Scorzonera rosea, Ajuga genevensis, Meum*

137 *mutellina*, etc. The forester mentioned that beech forest was of no practical value but that hornbeam (*Carpinus betulus*) was sought after because of its hardness.

THE VEGETATION AROUND CORBU.

OF the vegetation around Corbu, the special village studied, little need be said: the hillsides had in many places been denuded of timber for building and domestic purposes throughout the whole length of the village.
THE following zones may be distinguished:

241 1. THE ZONE OF THE VALLEY BOTTOM (BISTRICIOARA).

THIS was devoted to agriculture, but the maize was poor in comparison with that seen on the hot Wallachian plains; patches of barley occurred chiefly on the south-facing slopes, and there were small patches of potatoes and hemp; hay was cut on the meadows near the river and on the lower slopes.

2. THE ZONE OF FOREST.

137 313 SPRUCE was the dominant tree, but on the church side of the village, particularly towards the Borsec end, stretches of Scots pine (*Pinus sylvestris*) had evidently been planted just above the valley floor. This was presumably to retain detritus and to consolidate the soil as they were planted much too closely to have any economic value for timber. Conversation with the forester on Runcul above Tulgheş confirmed this fact and Dr. Pop, the botanist at Cluj, also mentioned that *Larix decidua* var. *polonica* had been planted above Corbu. The schoolmaster said that the valley floor and lower slopes had originally been covered with trees and that wood was very cheap but labour was dear. Timber plays a very great part in the domestic economy of a village like Corbu, being used for building, furniture, carts, looms, winding frames, etc., as well as for fuel.

THE TRAIN JOURNEY FROM TOPLITA (OLAH TOPLICZA) TO CLUJ.

241 137 FINALLY the train journey from Topliţa to Cluj afforded another opportunity for observing the crops grown. All along the railway in the Mureş valley much maize was

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grown with sunflowers round the edges of the fields; little tent-like stacks of hemp were seen drying, and on one occasion a field of tobacco was noticed. The common tree was the false acacia (*Robinia pseudacacia*). Along the stream sides one invariably saw the flowering rush (*Butomus umbellatus*). Vines were seen growing around Rasboeni.

A VERY interesting salt marsh area was noticed before reaching Cluj, large areas being covered with sea aster (*Aster tripolium*) and a species resembling sea lavender (*? Statice gmellini*) recalling the vegetation of the salt marshes on the North Norfolk coast around Blakeney, etc. AT CLUJ we were privileged to visit the fine Botanic Gardens under the guidance of Prof. Emil Pop, and saw the special floras of the various regions of Roumania.

IN CONCLUSION I should like to mention my indebtedness to Miss Vines and Capt. Chase for their observations and lists of plants from various areas which they visited.

HENRY J. HOWARD, F.L.S., F.R.M.S.,

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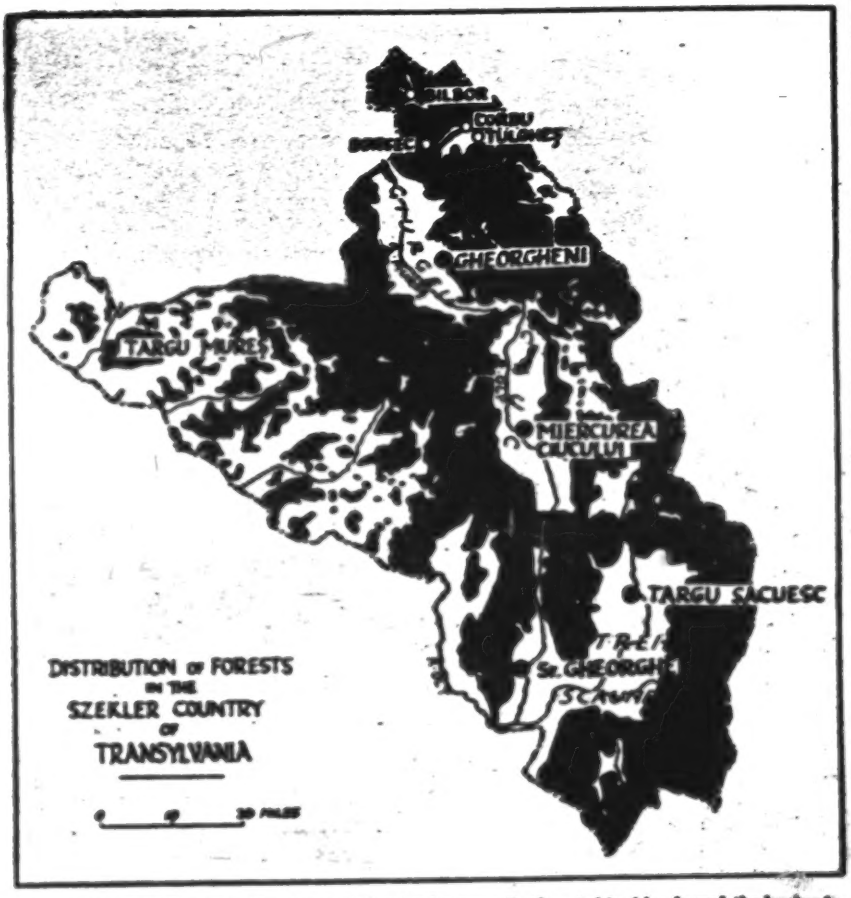

FIGURE 6. This illustrates the sharp distinction between the forested highlands and the lowlands, and should be compared with Figures 5 a...

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majorities have resulted from the valleyward movement of families that had previously farmed the slopes overlooking these intermont basins.

361 361 AN IMPORTANT distinction between the Roumanians and the rest of the population is seen in the types and distribution of their settlements (see Fig 5). The former, with their customary attachment to highland areas and to pastoral life, are usually associated with a dispersed or loosely agglomerated

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VI.—ECONOMIC ROUMANIA

AGRICULTURE.

311 MODERN ROUMANIA is essentially an agricultural state, as 162 was the Old Kingdom (43 to 46 per cent of the land being arable and 22 per cent forest, whilst over 80 per cent of the population of 18 millions are agricultural workers), although it has valuable potentialities for the development of industry.

132 ARRANGED in zones round the bastion of the southern and 24 eastern Carpathian highlands, the main agricultural regions 134 of post-war Roumania exhibit, according to aspect and altitude, a considerable variety of climatic conditions, which is reflected in a varying emphasis in the selection of crops raised. In general, we may say that the continental nature of the climate and the resulting succession from north to south and from highland to lowland of soils, graded from poor ashen-grey podsol in the Carpathians through oak-forest loams to a rich chernoziom in the south-eastern Danube plains, has resulted, wherever the ground is sufficiently level, in a concentration on grain production. The heavier rainfall of the uplands, the relatively great humidity and shelter from the driving winds that sweep across the open plains, coupled with the exposure of less fertile rocks—granites and coarse sandstones—explains the large area of forested land (24.5 per cent, nearly 7¼ million hectares) in those districts that extend into the Carpathian highlands.

243 OF THE 13 odd million hectares of arable land, cereals occupy some 37 to 39 per cent. Production varies greatly from year to year and from district to district. In the old kingdom of Wallachia-Moldavia, maize is by far the heaviest crop, particularly in Oltenia, where the summer rainfall is heavier. It is also the heaviest crop in Transylvania, the cultivated areas under maize, wheat, barley and oats being [262] respectively 4, 3, 2 and 1 million hectares. Maize is the staple crop of the peasant holder almost throughout the country, for it not only provides the bread cakes and the "mamaliga," maize pudding, the main food of the mass of the people, but also fodder for the cattle to eke out the hay in

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Captain and crew. Photo: Dr. C. P. Sandgren.

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Passengers.

These two photographs give a good impression of the gorge-like character of the transverse section of the Bistrita where it is cutting through crystalline schists. Photo: R. A. Pelham.

[facing page 48]

231 considerable admixture of cross-bred Swiss. On the Wallachian plains we find a cross between the Moldavian cattle of the plains and the Hungarian type which gives good milk, is easily fattened for market, and makes a good draught animal. Throughout the Danube plains the powerful water buffalo is important for draught purposes and for milk, and may be seen frequently also in the Transylvanian plains.

FOREST.

● 237 RICH in ploughland and not ill-provided with pasture, Roumania is fortunate in a third type of land utilisation which brings her vast acreage of mountainous upland into service. Forest covers about one-quarter of the land surface. Its greatest development occurs on the sandstones of the Flysch formation. Coniferous trees clothe the higher slopes above 1,400 metres, particularly on the Moldavian and Bucovinan frontiers of Transylvania. Below the coniferous forest zone with its peaty, acid soils, stretches the zone of beech forest, mixed, on its lower edge with oak. (It is the beech forest that has given its name to Bucovina.) Here the characteristic soil is the leached, ashen-grey podsol, yielding poor crops in the clearings unless heavily manured. This zone tongues up the valleys into the coniferous zone. It widens to 100 kilometres in the Siret and Olt basins, but narrows in Muntenia, where the high mountains drop abruptly to the agricultural plains. The beech, unfortunately, has little economic value, and to this, with its poor soil, may be attributed the survival of so large a part of the beech forest. Its chief use is for firewood.

THE OAK FOREST on the lower slopes and foot hills, with its relatively rich brown soils, has naturally suffered most at the hands of settlers, and survives to-day mainly on the ridge combs and hill-tops. There are several species of oak, and hornbeam, lime and elm appear here and there in the oak forest with beech and birch on the upper margin of distribution. In Transylvania the lower hill country has been practically cleared of forest.

313 TIMBER is one of the mainstays of life of the peasant. All the constructional work of his village—dwelling house, barns,

3: Fleure S-5 (no date) I-39 EDI Rumania EDI

FARMING AROUND CURTEA DE ARGEŞ

Amy R. Burgess

133 In the region of Curtea de Argeş the river flows in a valley of varying width, floored with fine sandy alluvium and bounded by somewhat rounded hills. Some traces of river terraces are discernible.

The land of this region can be divided into four categories: (*a*) arable, (*b*) hay meadows, (*c*) forest, (*d*) high mountain pasture. The arable land is principally on the first terrace, but stretches both down the slope to the valley bottom and up the slope to the second terrace. The hay meadows are above the arable land, spreading upwards towards the [137] forest. The forests comprise 75 per cent of the total area, and consist mainly of timber trees, such as beech and pine, together with a considerable number of walnut trees. The high pastures are above the forest belt and may be as much as fifty kilometres away from the village centre of the commune to which they belong.

423 The arable land is owned by the peasants, holdings ranging from less than one hectare to fifty hectares, the majority being from two to five hectares. The smallness of the holding [428] is due partly to the laws of inheritance, by which the land is divided between the children on the death of the owner, and partly to the fact that the district is so hilly that only small areas are available for cultivation.

241 476 The hay meadows belong to the commune and are both worked and used collectively by the peasants, all necessary organization being in the hands of the mayor and committee.

471 [313] The forests are largely state-owned, although some portions belong to the commune, in which case the peasants are allowed to cut for their own personal use (house-building, implements, etc.), but not for profit.

[233] The high pastures belong to the commune; the peasants pay a small fee to the commune for their use (20 lei per head per season for sheep, rather more for cattle).

132 An important climatic feature affecting agriculture is the shortness of the summer, late spring and early autumn frosts

dependent for the working out of its economy, as for its setting, upon the high Southern Carpathians.

WHILE IN some parts of Roumania all the sheep must be moved to distant highlands in summer, there are many regions which have sufficient local pasture to keep a certain proportion of stock through the year. This applies to the country around Curtea de Argeş; here the late Tertiary (Pliocene) deposits are provided with frequent terraces. The lower terraces are glacial and may be three in number; higher up the dip-slopes of the coarse sands have often been cleared of the bad forests which still cling to the scarps, while at all levels slips have occurred in the loose materials to produce small mesa-like areas, sparsely covered with grass, juniper and birch, accessible to nimble sheep and goats.* In general, however, such local pasturage is reserved for cows in milk, while young cattle and bullocks, if not required for the many activities of farming and forestry, are sent with the sheep to the high pastures.

WE MAY best examine some of the features of this transhumance by following the sheep in their movements through the year in the valley of the Argeş and its background of high mountains, the Făgăraş, extending eastwards from the valley of the Olt. The commune of Corbeni, some seventeen kilometres upstream, provides us with a few figures. Here is the first widening of the Argeş Valley, for the river has left the last range of the Carpathians (1,500 m.) through which it cuts one of the great gorges which characterize this zone, and it is here entering on its braided course through the Miocene and Pliocene deposits to the south. The proportion of forested land in the commune is high (75 per cent), and its 2,500 sheep can be maintained only by extensive transhumance. The summer pastures are from thirty to fifty kilometres distant, the stâne† extending from the forest's upper limit (1,500-1,600 m.) to the scarred rock faces of the high core at 2,000 m. Each commune has its stână, which takes its name from the mountain on which it is situated: it is the property of the commune, but there are certain payments to be made each year for the services of

*Goats tend to be kept only by the poorer peasants; they are naturally not encouraged by the Forestry authorities.

†Stână (singular). The word is applied as here to the summer pastures and also to the huts where the shepherds sleep and make the store the cheese. By extension it is sometimes used for the general economy of transhumant shepherding.

B. TIMBER

313 NOTE: *As for other south-eastern European countries, the statistical and other data available on forest conditions is most insufficient. It has, therefore, been necessary to refer to the works of private foresters who differ considerably in their statements and conclusions. The statements which follow are, it is believed, substantially accurate, but must be considered with a certain degree of reserve.*

I. PRE-WAR SITUATION

The forests of Rumania were one of its most important natural resources and of much value to the country's general economic welfare. A large part of the fuel requirements were supplied in wood, in addition to which the country was self-sufficient in its needs for constructional timber, etc., whilst timber exports took third place after grain and oil. The timber industry was, however, over-expanded in relation to the size of the forests, the normal yield of which although able to cover domestic requirements, was not sufficient to meet the heavy extra demands for export. The result was that over many years up to the outbreak of the present war, the relatively high exports were only made possible by considerably overcutting the forests.

1. Area, Location and Species

●137 According to the last known survey, Rumania's forest land covered about 7.1 million ha. (27,000 sq. miles), of which about 90 per cent., or 6.4 million ha., were stocked—equalling 24 per cent. of the total land surface. As was to be found in all Balkan countries, the forests were dominated by broadleaf species, the area under conifers being only 25 per cent.

The following table shows the division of the stocked forest area by regions and species, in '000 hectares —

[31a]

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	Old Kingdom	Transylvania	Bucovina	Bessarabia	Total	% of Total
Conifers	474	829	312	—	1,615	25
Beech	820	1,528	103	2	2,453	38
Oak species	706	723	6	114	1,549	24
Sundry hard broadleaf* ..	344	141	23	54	562	9
Sundry soft broadleaf† ..	173	61	6	30	270	4
Total	2,517	3,282	450	200	6,449	100

* Including hornbeam, alder, ash, etc.
† Including lime, birch, willow, poplar, etc.

16: Great Britain G-4 (no date) 1943
ED1 Rumania ED1

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About 85 per cent. of the forests, representing those that were the best and most extensive, were located in the hills and mountains—particularly in the east and south Carpathians, the

●137 Banat and in west Transylvania; and of these 15 per cent. are not easily accessible and are unremunerative to exploit on account of heavy capital expenditure necessary to build suitable roads and railways. The forests of the plains were of minor importance, especially since they consisted almost entirely of young trees yielding firewood only.

Beech was the principal forest tree, except in the plains, where it gave way to various species of oak. The eastern Carpathians constituted the only predominantly coniferous regions.

[423] The following table shows how the forests were owned and managed; column 1 shows the area in million Hectares, column 2 the equivalent in square miles:—

	I	II	% of Total
State owned	1.9	7.3	30
Owned by communes, churches, etc.	2.0	7.7	30
Owned by companies and private persons.. ..	2.5	9.6	40

About 70 per cent. of the forests were treated as "high forests" (i.e., allowed to grow naturally) and the remainder were under varying forms of "coppice management" (i.e., allowed to grow from roots after cutting, thus producing small timber).

2. Annual Increment and Domestic Consumption

313 439 Chiefly as a result of Rumania's Agrarian Reform policy in 1924 and 1925 of clear-cutting huge forest areas to provide peasants with additional agricultural land, very large volumes of timber became available for the export market, with the result that a wrong impression was created abroad that Rumania was a country with a large export surplus of timber.

16: Great Britain G-4 (no date) 1943 ED1 Rumania ED1

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	Consumption			
	Per capita	Total	Annual growth	Surplus
	solid cu. m.	'000 *solid cu. m.*	'000 *solid cu. m.*	'000 *solid cu. m.*
Firewood	0·50	9,250	12,590	3,340
Timber :—				
Conifers ..	0·17	3,123	3,230	108
Broadleaf ..	0·14	2,660	2,800	140
	0·81	15,032	18,020	3,588

[31f]